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Romancing the Rabbit 4

What if cartoon characters were real performers who lived and breathed and worked on movie soundstages like any other actor? With the considerable might of Walt Disney Studios and Amblin Entertainment behind him, director Robert Zemeckis took that offbeat notion and from it concocted *Who Framed Roger Rabbit* — a frenetic comedy adventure combining live-action and animation with a degree of realism never before attempted. Mechanical effects by George Gibbs and Michael Lantieri enabled actor Bob Hoskins and others to interact convincingly with characters that had no on-set presence. These characters were later provided by some three hundred artisans working under animation director Richard Williams and were then seamlessly integrated into the live-action — complete with shadows and highlights — by the optical wizards at Industrial Light and Magic. *Article by Adam Eisenberg.*

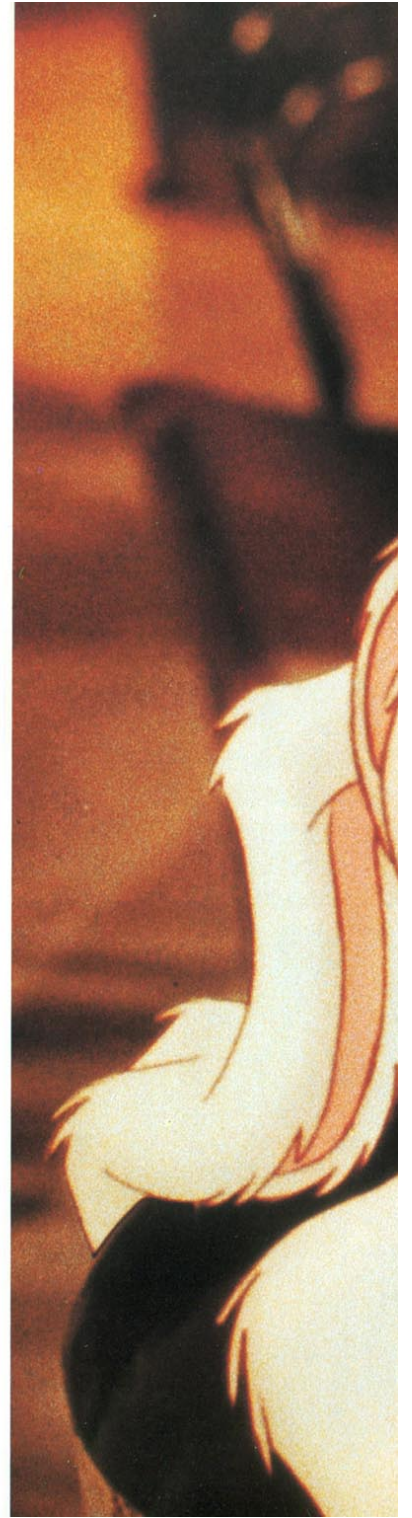
Willow 34

Filmmaking impresario George Lucas — whose flights of fancy have spawned the *Star Wars* trilogy and the adventures of Indiana Jones — has focused on myth and magic for his latest excursion into the world of unbridled imagination. Manufacturing an earthbound environment every bit as wondrous and complete as Tatooine or Endor, Lucas and film director Ron Howard have produced *Willow* — an epic sword-and-sorcery adventure complete with fairy princesses, evil queens, fire-breathing dragons, pesky brownies, talking animals and a diminutive hero determined to save an infant foundling from the forces of evil. *Willow* represents the most complete mustering of Lucasfilm effects talent since *Return of the Jedi* — employing effects animation, miniaturization techniques, stop-and-go-motion, animatronics and computer generated imagery. *Article by Jody Duncan Shannon.*

FRONT COVER — Roger Rabbit reacts hysterically in *Who Framed Roger Rabbit*.
Jessica performs her nightclub act in *Who Framed Roger Rabbit* — BACK COVER.

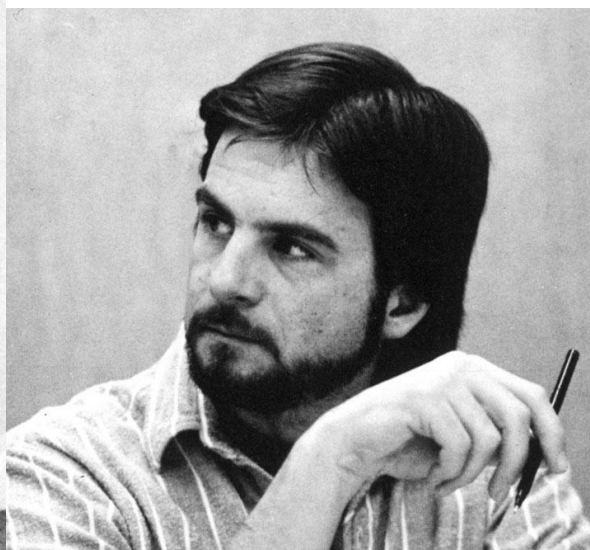
Romancing the Rabbit

article by
Adam Eisenberg









live-action. Then he waited. "The next thing I heard was about two weeks later. Zemeckis rang up and he said: 'I've never seen anything like it! This is it! You won't believe it!' And I said, 'What do you mean?' He said: 'The test, the test! It works! Spielberg's seen it in New York and he loves it. He said he's only seen film history twice in his life. The first time was with the tests that George Lucas did for *Star Wars* — and now he's seen it again with this rabbit.'"

"It was pretty impressive," Zemeckis enthused. "We were all really blown away. I said, 'Wow, we're really going to pull this off.' It was breathtaking. Once the guys at Disney saw the test, that was it. Green light. Make the movie. It had to be done. Animation is the heritage of the Walt Disney company — and we were about to embark on animation for the '90s." What the test proved most of all was that Zemeckis could realize his dream of shooting *Roger Rabbit* like a normal live-action film in which the Toons would have to adhere to the spatial realities of our three-dimensional universe. If the camera moved in a given shot, then the animation would have to change perspective and constantly adjust to the changing point of view. If a light in the scene was swinging, causing shadows to sweep back and forth across the human actors, then the Toon characters would have to be lit in exactly the same way. Again, the key was interaction — having the Toons not only move physical props, but also interact with the real environment around them." Making all of this happen would involve three basic stages. First, the live-action would have to be filmed with Bob Hoskins and other cast members working alone in a maelstrom of complex physical effects. Then Williams and his team of animators would create the Toon characters — some famous, some not — to share these scenes with the humans. Finally the live-action and animation would be sandwiched together at ILM under the watchful eye of optical supervisor Edward Jones. None of the steps was easy.

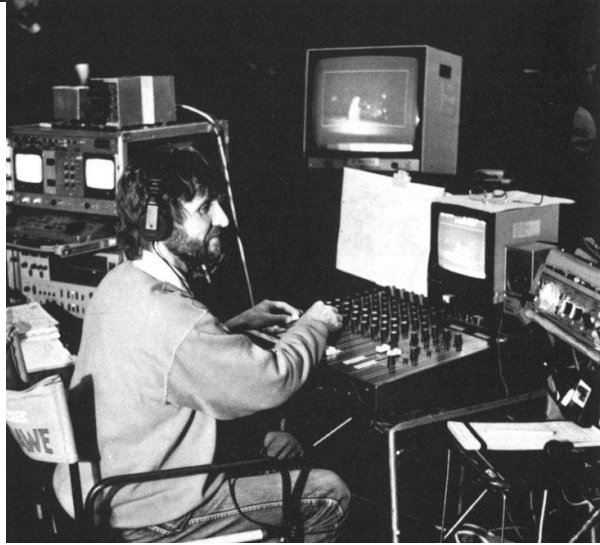
The first stage of the process began in Los Angeles where several key exteriors were photographed. The most complex of these involved a furious chase between an animated taxi with Eddie Valiant at the wheel and a real patrol vehicle being driven by the animated weasels. In earlier screen efforts, such a sequence might have been done by filming Hoskins on a blue-screen stage and then matting him into a background plate shot on location. For *Roger Rabbit*, however, Zemeckis wanted first generation imagery of Hoskins actually on the street riding in a car that could later be concealed by the taxicab animation. Engaged to produce the vehicle — as well as all the other phys-



live-action. Then he waited. "The next thing I heard was about two weeks later. Zemeckis rang up and he said: 'I've never seen anything like it! This is it! You won't believe it!' And I said, 'What do you mean?' He said: 'The test, the test! It works! Spielberg's seen it in New York and he loves it. He said he's only seen film history twice in his life. The first time was with the tests that George Lucas did for *Star Wars* — and now he's seen it again with this rabbit.'"

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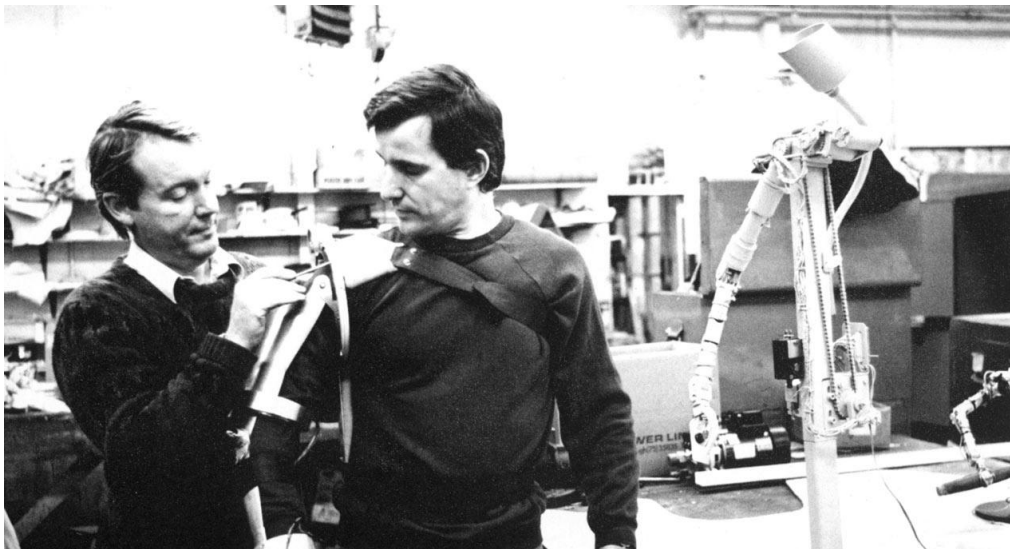
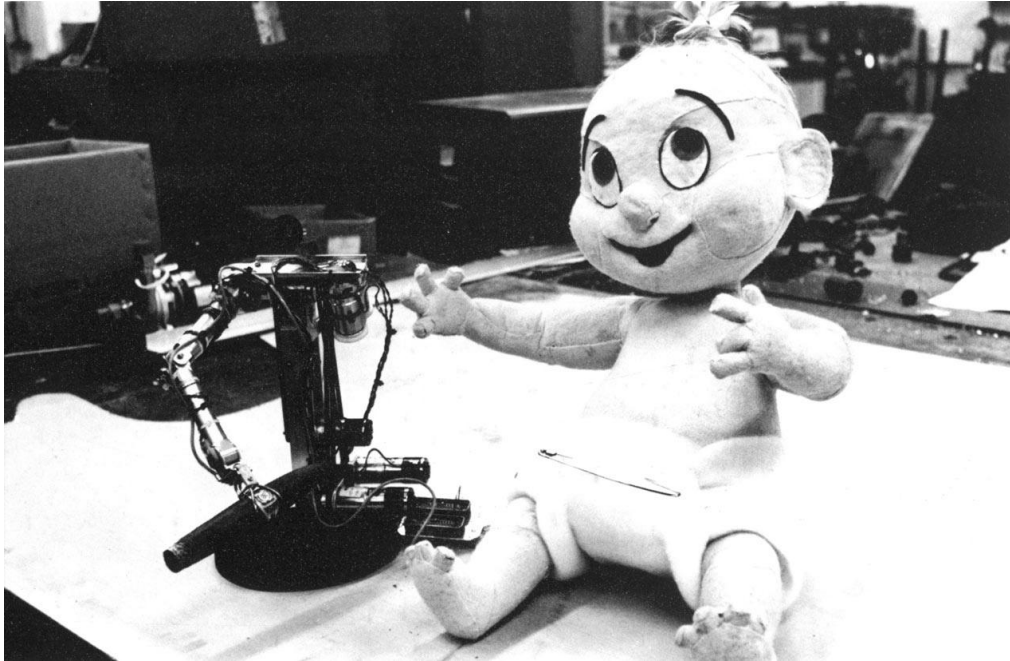
this armature relayed exact positions of the human arm to the robotic arm, enabling the robotic arm to duplicate the human moves. "Carlo Rambaldi and a lot of other effects men work only with cables, but we do everything with servos. I find it cuts down on manpower and it's a lot cheaper. When you do miniature arms, the difficult thing is getting the gearing strong enough and small enough. But when you're doing it on big stuff, you don't have any problems because it's very strong — much stronger than with cables that are snapping all the time. Of course, it doesn't work for everything. We use what we call 'horses for courses' — you have a special type of race horse for a special type of race course. You get some horses that are good at running on hard ground and some horses that are good running on soft ground. Sometimes we used armatures for the weasels and sometimes we used just sticks and things — sometimes we used wires. It depended on what we were shooting at the time. That went for Roger also."

To facilitate shots employing wires and puppetry, Gibbs suggested that all of the sets be built at least six feet above the floor so that human operators and puppeteers could work from below if necessary. Throughout the shoot, Ralston and Gibbs conferred to make certain the physical effects would fit within the parameters of the animation. "In many scenes," said Ralston, "Roger would be walking around the set, grabbing stuff here and there. In one shot in the Terminal Bar, he was nervously grabbing things out of a toolbox and flinging them across the room. He even grabs a hammer at one point. These kinds of effects could be accomplished much more simply without the robotic arm. The hammer, for instance, was suspended on wires that we were able to later hide behind Roger."

In another scene, the weasels burst into Valiant's office and living quarters in search of the slap-happy hare who has clownishly handcuffed himself to his benefactor's wrist. Quick on his feet, the detective dunks Roger into a kitchen sink filled with dirty socks and then proceeds to wash his laundry while the weasels search the apartment. During the scene, the cocky lead weasel named Smart Ass pulls a real gun on Valiant. "We had a robot arm come up from behind where the weasel would be," Ralston explained, "giving the impression that the weasel reached down to get the gun. Then Smart Ass lowers the gun and splashes dishwater on Valiant. For that, the dishwater was rigged to splash. Then, after the weasel leaves, Roger comes up and squirts dishwater out of his mouth. Bob Hoskins was pantomiming the handcuff all the time and George had a rig devised to pop up out of the sink and spout water. At the proper moment, the rig came up and shot water out and then dropped back down so Roger could do the rest of his action. Planning the shots out beforehand was the most important part so that everything could be covered by the animation — the rigs had to be made



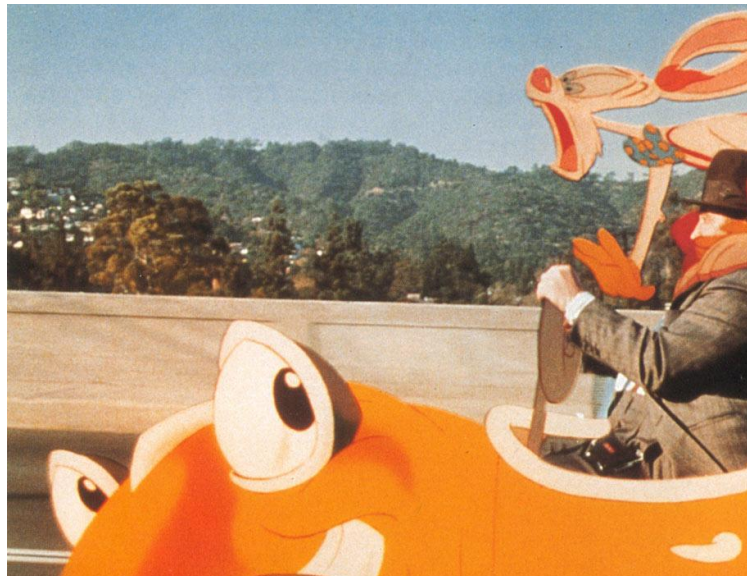




hundreds of feet long, a hundred feet wide and maybe another hundred feet high," recalled effects cameraman Scott Farrar. "It was also condemned, so part of the effort was put into rehabilitating the structure so that it wouldn't fall down on us while we were in there." Once reinforced and dressed as a set, the building would serve as the locale for a desperate battle between Eddie Valiant and the evil Judge Doom. In the scene, Doom unveils a specially designed pumping vehicle filled with enough 'dip' — a Toon-dissolving blend of turpentine and benzene — to erase Toontown and all its cheery inhabitants from the face of the earth. When Roger tries to intervene, he and Jessica are tied up and hung from a hook near the truck. Then, as Valiant struggles with the forces of Doom, the pumping mechanism is turned on and off and on again, threatening Roger and Jessica with death by dip. "In the film it all goes by pretty quickly, but in reality it took seven weeks for the truck to move from one end of the building to the other. Because of the way the sequence was set up, we had to move it a little bit, shoot the master scenes and all the inserts, and then move on. Dean lit it to look like nighttime even during the day — and from inside, you never knew what time it was."

"The Acme factory was interesting because we operated with both a first and second unit," Watts added. "We often do this on a film, but because the factory was a progressive set — one that deteriorated in a progressive fashion during the sequence — we were not able to do what we normally do, which is shoot the first unit and then let the second unit come in and do all the cleanup work. Instead we had the two units working around the clock, with the first unit working during the day and the second unit working at night. It's the first time I've ever operated a set more or less twenty-four hours a day. We made the decision to do so shortly after we started filming — and frankly, it was the only way to do it."

One of the major props in the film was the giant dip truck — actually a heavily modified American-made World War II bridge building vehicle. "When the war finished," said Gibbs, "there were hundreds of these huge ten-wheel-drive trucks left in England and garage owners bought them to make breakdown vehicles. We found one ten miles from the studio and it was in very good condition. The engine was perfect, but since we were working inside the old power station we had to use something other than the original diesel engine because of the fumes. So we put in a really big twelve horsepower electric motor with a gearing mechanism and then drove the truck electrically. The dip truck was very complicated because there were hydraulics on it, electronics, flashing lights and a cannon going up and down and round and round with water squirting. It was so complex that we actually had an umbilical cord going to it with about sixty wires in it, all hooked up to a control console that



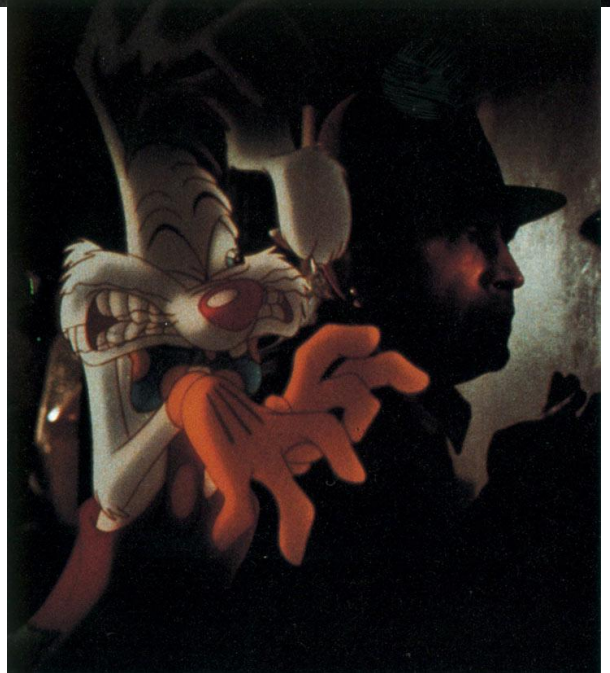


high-intensity water delivery systems — to cut steel and concrete. Finally he employed in oil tankers to clean out th has been emptied. "This particular ne designed with flow straighteners, so w through at about a hundred and fifty p bulence in it was rectified. It was just water came out perfectly straight — a si fall-off. This was terrific because it mac powerful — which it was — but the real camera and crew could get right up clo wet because it sprayed sixty feet in a p

Though the sprayer provided a coher — a mixture of green fluorescent dye : got all over everything. "On second uni we were shooting a lot of the stuff actu of the nozzle of the dip truck, the scei would set up for a shot and actually sp walls and over the giant Acme toys an stand around in 'wellies' — as they call — and do the take. Then to do a retake thing down with water, get out large ga around to dry everything off, sweep eve down the drains, clean up the floor, b start it all over again. It literally took s were ready for a second take. And this every night — it took forever!"

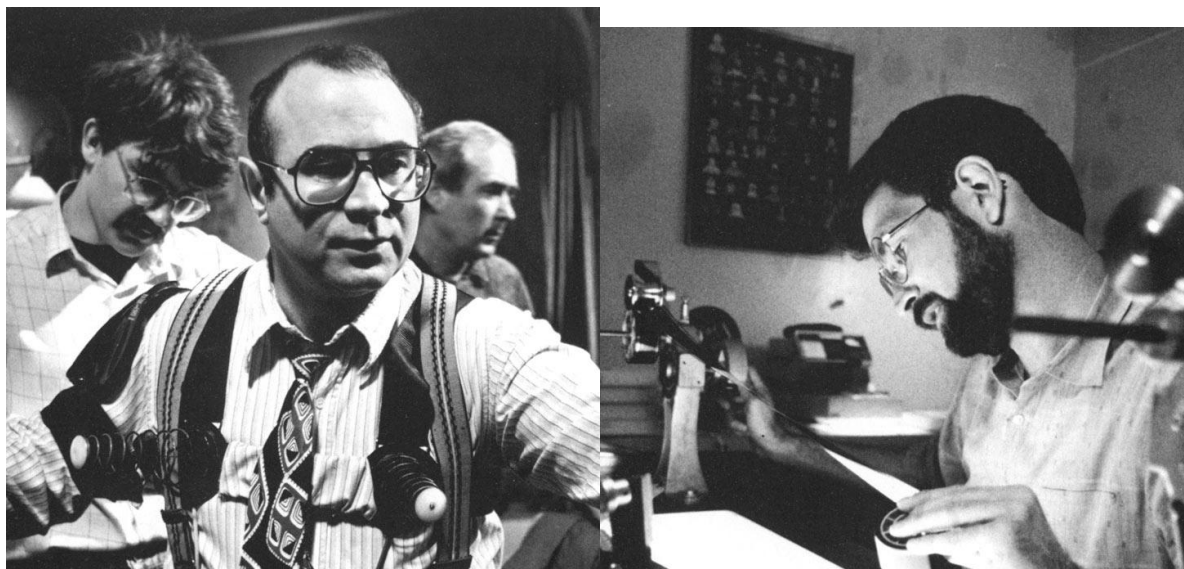
Another aspect of the sequence was a Judge Doom gets flattened by a steamr punching a container of Acme glue whil Doom swings at his opponent and mis front of the steamroller with his sticky stantly to the drum. Within moments, t over him, crushing him flat. To create t by having actor Christopher Lloyd stan floor. "The factory had a big space u about twenty feet deep — and the floo about eight inches of concrete. We cut a floor and replaced it with plywood. Nexi cut out the shape of him lying at abou that we had his shoulders and head abov and part of his waist underneath the b legs made of tin and zinc which we ma whole thing worked really well becaus though he were lying flat on the floor. T and we had a couple of guys underneath up and down so it looked like he was sq Then the roller ran over his legs and fl:

However this is not the end of Doo: mouthed as the flattened villain gets ba







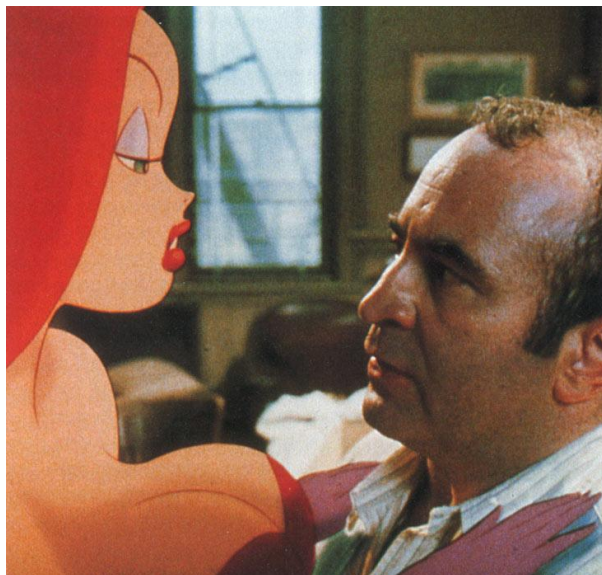


appearance, these sheets were sent to the animator assigned the task who was then allowed to select the style he personally liked the best. Researching Mickey Mouse and Donald Duck and the other Disney stars was easier since all Williams had to do was go to the source. "The morgue at Disney is the most marvelous place in the world for a serious animator. If you want to know how Bambi ran around in the thicket or how Thumper bit his foot, there it is. You can just go to that scene and pull out the original drawings, because all of them are there. And since this was a Disney movie, when we had to animate Dumbo and were working out the flap of his ears, we would get three scenes of him flying and either crib from them directly or make them better, which we attempted to do."

Williams' goal in doing all this research was to make certain that the animation in *Roger Rabbit* was firmly rooted in the late 1940s. When the opening cartoon called for a kitchen setting, for instance, Williams researched kitchens of the period to insure that he and his staff would avoid any anachronisms. Interestingly enough, the original script and the novel on which it was based were both set in contemporary times. Zemeckis changed this, not only to add a sense of timelessness to the film, but also to avoid a potential clash of animation styles. "I felt that we had to draw a line on the animation somewhere, and the perfect place to do that was at television. I didn't want to have to involve the TV characters like Fred Flintstone because they would not have looked right. All of the Toons in our film had to be fully animated, and television features limited animation. In a way, I wish we could have included the limited animation characters because my personal favorites are Rocky and Bullwinkle and the Jay Ward guys — but they wouldn't have fit in with the rest of the characters. I don't know what Rocky would have looked like with a bunch of tone mattes and shadows on him."

One character Williams did not have to research was Roger. He did, however, have to provide reference sketches for other animators since there was no way he alone could have animated all the *Roger Rabbit* scenes. Because Roger appears throughout the film, a lot of different animators worked on him — and while audiences would be hard-pressed to notice, Williams was able to detect changes in the rabbit's appearance from scene to scene. "Bob Zemeckis would say: 'Isn't it great? It's just this one rabbit. How did you do that?' And all the animators would say, 'No, Simon Wells' rabbit is different from Andreas Deja's rabbit, and both of those are different from Phil Nibelink's.' One of our animators — Nik Ranieri — is a tall, thin Italian

With only a few attempts, Williams enters the search of a rabbit who can squirm in a garment, fitted with a manned operator. technicians at ILM. Most of the film's fifty-seven screens of the ne



appearance, these sheets were sent to the animator assigned the task who was then allowed to select the style he personally liked the best. Researching Mickey Mouse and Donald Duck and the other Disney stars was easier since all Williams had to do was go to the source. "The morgue at Disney is the most marvelous place in the world for a serious animator. If you want to know how Bambi ran around in the thicket or how Thumper bit his foot, there it is. You can just go to that scene and pull out the original drawings, because all of them are there. And since this was a Disney movie, when we had to animate Dumbo and were working out the flap of his ears, we would get three scenes of him flying and either crib from them directly or make them better, which we attempted to do."

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crazy clown firemen running around trying to extinguish the blaze while struggling to catch an elephant jumping out one of the windows." Another gag that we loved involved Tex Avery's wolf," Jane Baer recalled. "We had him coming into Toontown in one of those super-long cartoon cars that bends when it goes around corners. The wolf drives up to the curb in a big cloud of dust, screeches to a halt and drops off a passenger. Then he says, 'See ya, Toots,' and speeds away — and left standing there is Snow White brushing down her dress. That had to go because Disney did not want to tarnish her image."

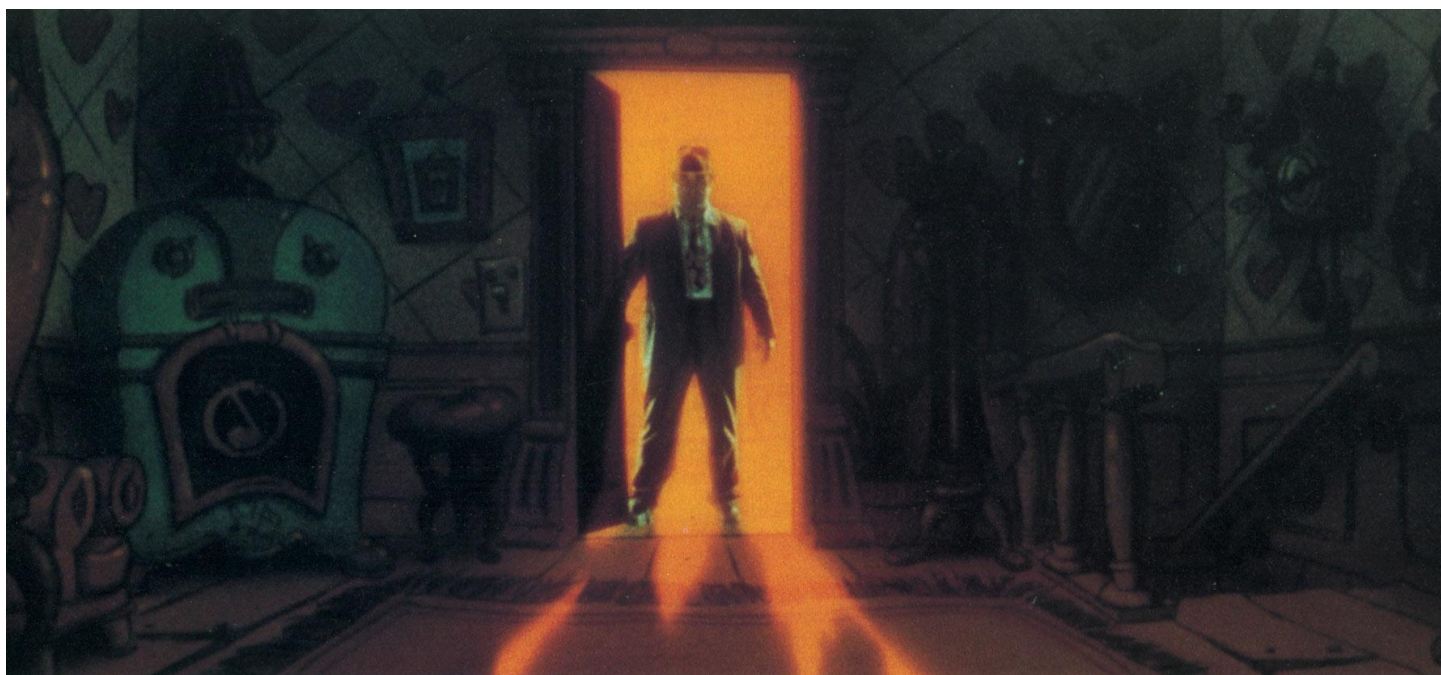
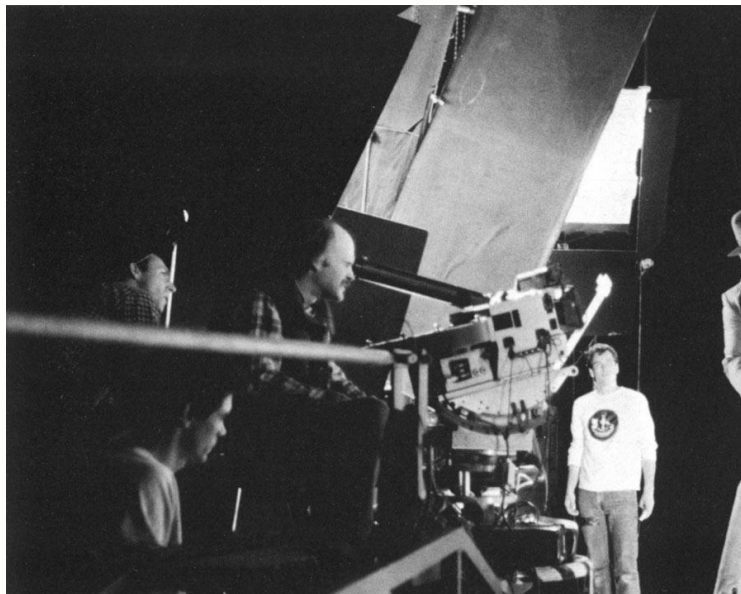
Snow White may not have made it into the Toontown sequence, but Disney's biggest star did — in a scene that also featured Warner Brothers' biggest star. Sighting a silhouette he takes to be Jessica Rabbit on the top floor of a Toontown hotel, Valiant endures a hair-raising elevator ride and then enters the room in question only to find the love-starved Lena Hyena. Fleeing her advances, the detective darts into a restroom. Suddenly he realizes that the room has no floor and he is actually standing in midair. In typical cartoon fashion, he remains in stationary suspension until the full gravity of his situation sinks in — then he starts to fall. Valiant thinks he is saved when he manages to grab hold of a flagpole, but Tweety — already on the pole — playfully peels his fingers away and sends him plummeting toward the concrete below. Suddenly Mickey Mouse and Bugs Bunny skydive into the frame. Valiant frantically asks if either of them has an extra parachute and Bugs obligingly offers him a spare — a spare tire, that is.

"In doing Mickey," Dale Baer recalled, "I was most concerned that he look like Fred Moore's 1947 Mickey. Mickey is not an easy character to draw. The slightest change in some of his shapes changes his whole look. All of these character had a key person who drew them, and you always want to emulate the master. Mickey could only have come out of Freddie Moore at that time, and I wanted to honor him because he was the Mickey Mouse king. One of the most difficult things about drawing Mickey was the fact that Dave Spafford was drawing Bugs — and Dave doesn't like anybody to see his work until he's done with it. You can't second-guess what Dave is going to do. He's a genius and he has everything all locked up inside his head and he won't tell you what he's going to do. It all just comes out while he's doing it. But if Bugs and Mickey are in the same shot and you don't know where Bugs is, how do you know where to make Mickey look? I'd say to him: 'Tell me where Bugs is in frame 147. That's all I want for now. Just tell me where he is and I'll leave you alone.' So finally he'd give me that and I'd

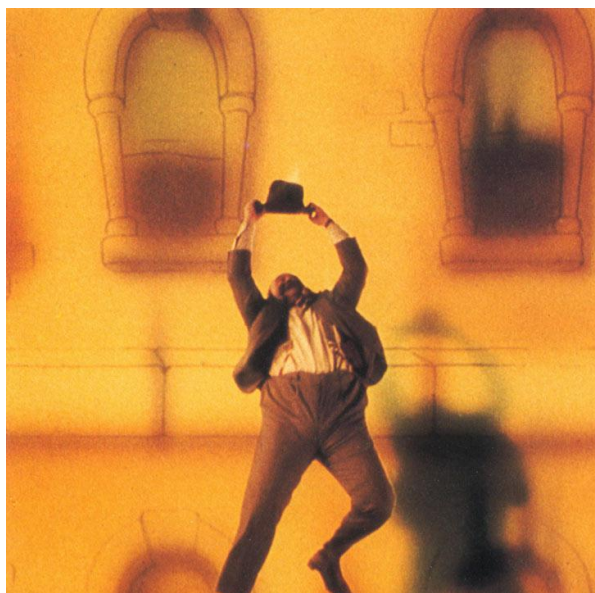
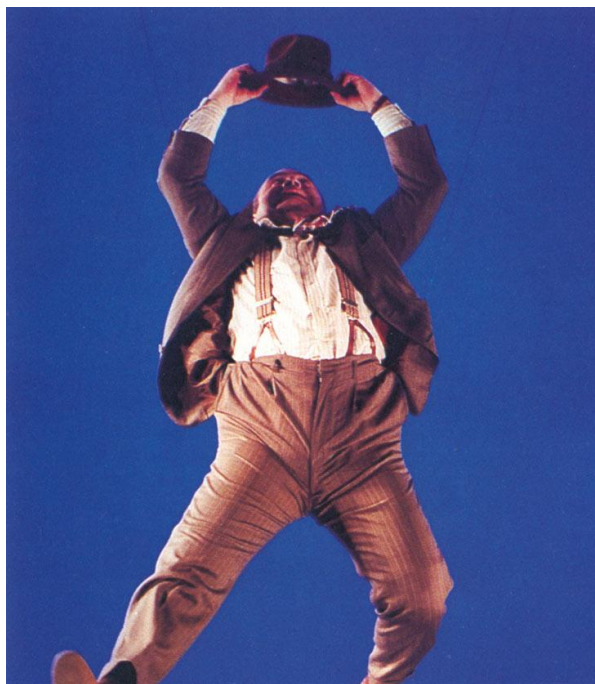


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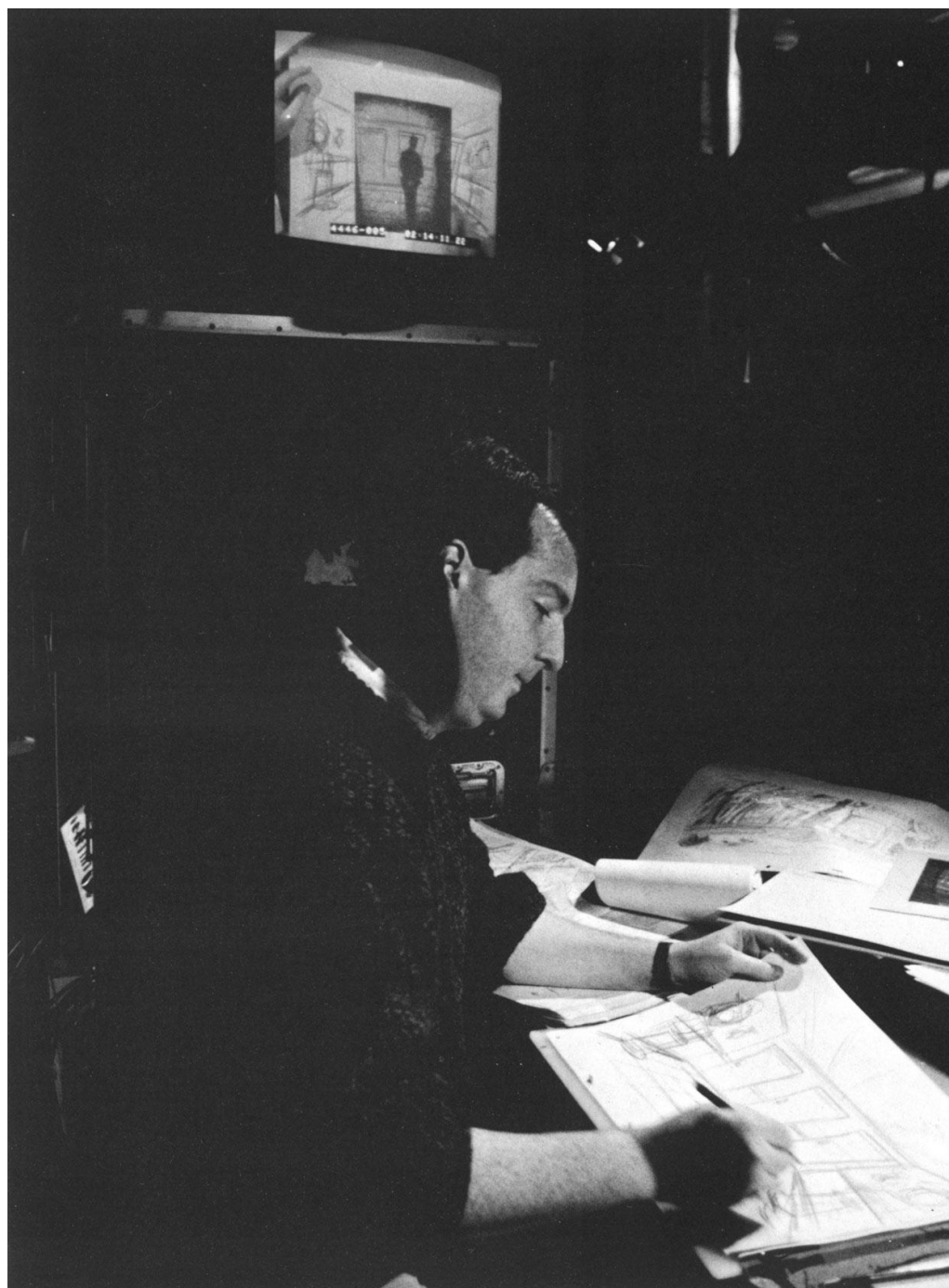
oughly storyboarded by the time Zemeckis and crew reassembled on the ILM bluescreen stage in December. "Bill Frake and I did extensive storyboards specifically for camera angles and for the shots themselves," noted Baer. "I think we spent two weeks working on them — from like seven in the morning to seven at night. Then Bob Zemeckis would come in and go over things with us. Finally we got everything ready, and Bill went up to ILM with the storyboards to work with them during the shoot."

A video compositing system was employed at ILM to assist in the bluescreen photography. First the animation storyboards — or variations of them — were placed in front of a video camera and fed onto monitors manned by the director and key technicians. Then, with a video tap from the main Vistavision camera, Hoskins was videotaped against bluescreen and matted over the storyboards, thus providing the filmmakers with an approximation of how the final shot would look. "The bluescreen shoot was really the reverse of what the rest of the film had involved," Zemeckis noted, "because here we had a human in a bluescreen void. In the live-action scenes we used a rubber dummy of Roger to show the animators the size relationship. With the video system, we drew rough background sketches right at ILM to make sure we were placing the human in the frame at the correct size. We also had all the storyboards — which we embellished at the time or even changed, because like all storyboards these were sometimes drawn in ways that a camera could never really photograph."

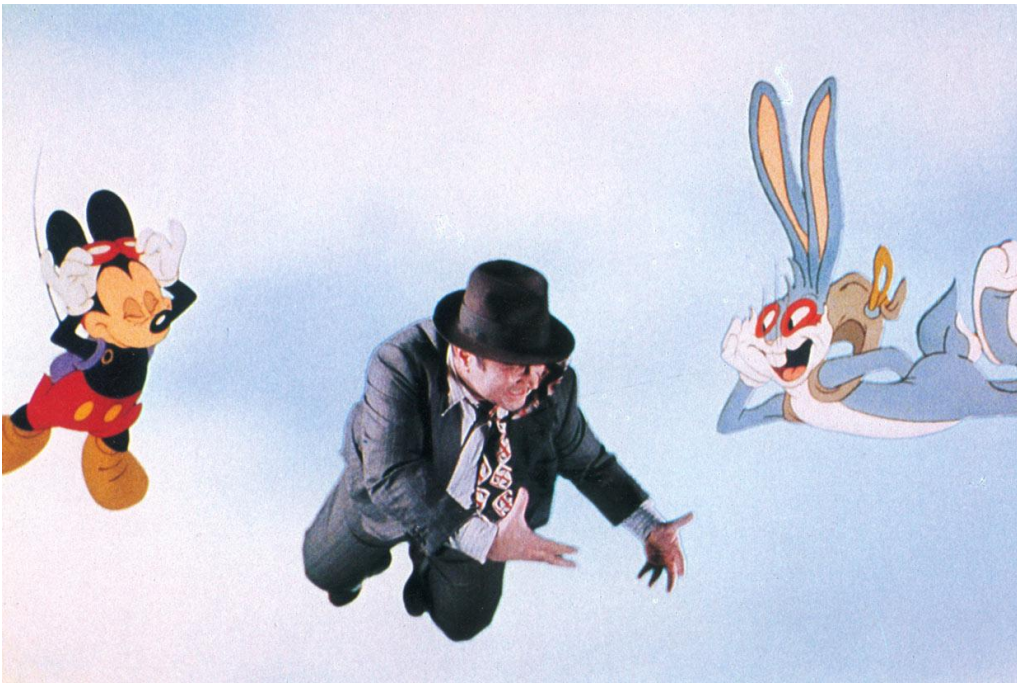
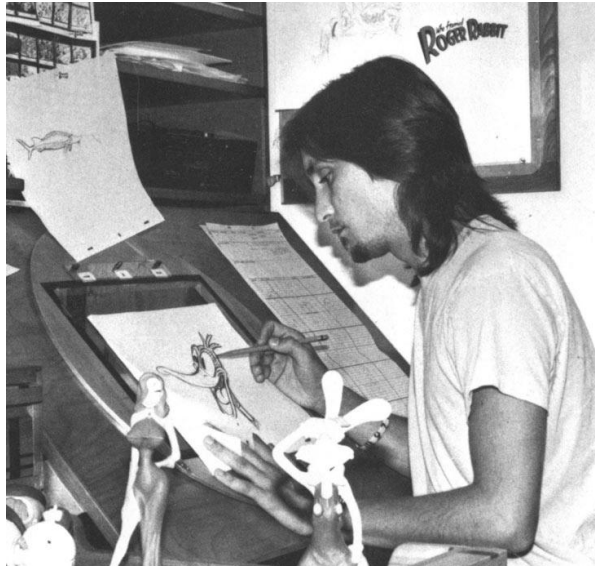
"The system made it easier for us and it made their shooting go faster," Baer added, "because when you're working with bluescreen, you have no idea where the horizon line is or where the floor plane is. The storyboards gave them a whole picture, so they could have Bob Hoskins' double walk through the shot and they could adjust the perspective on the layouts. Anything Bill had to adjust in the design of the layouts, he also did at this time." Besides getting a sense of Hoskins' place in the frame, the video system also helped Dean Cundey work with Frake to establish light sources in the shots. Cundey lit Hoskins on the bluescreen stage with a variety of different colored lights while Frake made corresponding sketches to insure that sources for those lights would appear in the background animation.

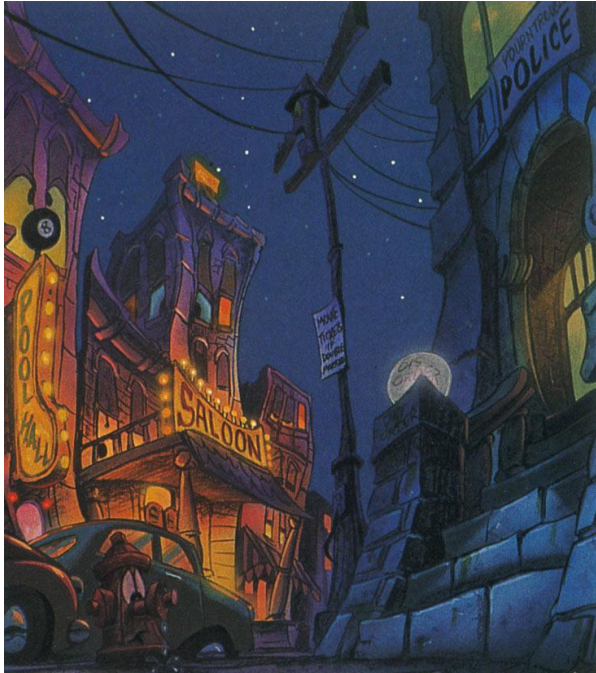
"Our Toontown bluescreen shoot was a nightmare," Ralston stated. "We had so much to do and very little time to do it. In the movie, five minutes are spent in Toontown. That's a lot — especially for a series of bluescreen shots. We had to do something like a hundred and thirty shots, one right after another — which is more than we have done for entire movies before — and all for this five-minute sequence. In the end, though, we planned it so carefully that we actually got done a little bit ahead of time and saved some money." In Toontown, Eddie Valiant's body is subject to the non-Newtonian physics of car-

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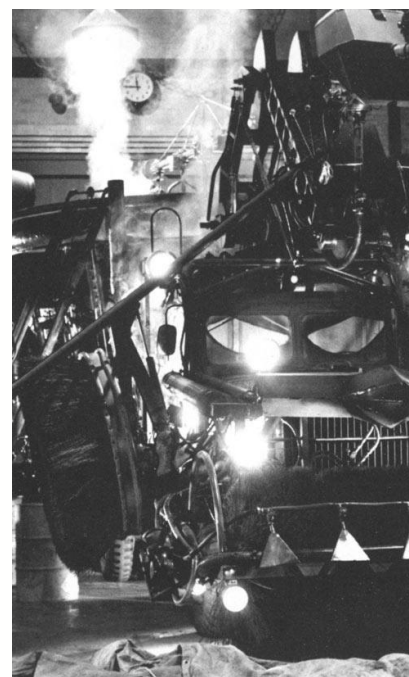
Judge Doom unveils the mechanism by which he intends to destroy Toontown — a giant spray truck filled with vast quantities of dip. The vehicle — fabricated by George Gibbs and his crew — was actually a vintage bridge builder. / For a later scene in which Doom is crushed flat by a steamroller, the Gibbs unit constructed a mechanized puppet. / In preparation for the scene, Christopher Lloyd was lowered into a hole in the floor with only his arms and head left protruding. The mechanical lower body — complete with rod puppet legs operated from below — was then attached at the chest and run over by the vehicle. / Doom's encounter with the steamroller reveals that he is actually a renegade Toon masquerading as a human. Undeterred by the flattening, he rises and walks over to an air bottle to reinflate himself — an effect achieved in part with a go-motion puppet shot bluescreen. / Modelmakers Ira Keeler and Steve Gawley top off the tank on a scale model dip

flicking the lighter and at times we had to take away the part of the octopus that was behind the lighter and make sure part of him stayed in front of it so it looked like he was actually holding it. He was also holding a shaker bottle, and I had to leave his fingers holding it but take out the part that was behind it. This kind of work is very tough. Sometimes I would go through a shot and get far along and then realize that I was looking at it wrong and had to go back and redo it. Then at different times the octopus went behind different glasses, so we had to do a distortion matte to make him look distorted behind the glass. Even though the entire shot was only two hundred frames long, it took almost a month to complete."

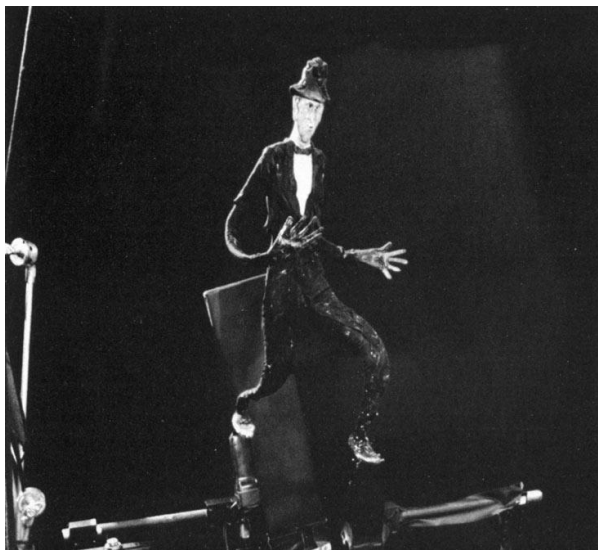
The animation and rotoscope departments provided several additional effects including the portable Toon hole that was seen in the Acme factory. In the film, a policeman rummaging around the factory finds one of the ubiquitous holes and throws it up against a wall. In cartoon tradition, he then sticks his arm inside the hole. In reality, a breakaway wall section was used on the set — hinged to allow the actor to pass his arm through the simulated bricks. In postproduction, this then was covered by the animated hole — designed by animation supervisor Wes Takahashi and rendered by Sean Turner.

Two years in the making, *Who Framed Roger Rabbit* is now in release and breaking boxoffice records. But its success was not a foregone conclusion — even for the filmmakers whose vision it embodies. "The main thing about Bob Zemeckis," observed Richard Williams, "apart from his smarts, is his tremendous courage. I can't imagine anybody I know who would take such a risk and shoot an entire movie with a hole in the middle of it — leaving that hole for the main character. Can you imagine that? When he would run this movie without the animation in it, it looked like a dog. He would get into terrible depressions. But as soon as the animation was put in, you could see that he had conceived each shot perfectly and that it was all working. But just imagine doing *Hamlet* without Hamlet. Every time Hamlet is going to come in, you hear a voice from off-stage — 'Alas, poor Yorick' — and nobody's there. Or maybe there's just a skull hanging on a string and Ken Ralston is going to paint the string out later. He had nothing there. That takes incredible courage, don't you think?"

"Robert Watts had the greatest description of *Roger Rabbit*," Zemeckis concluded. "He said, 'It's an epic movie — not because we're going to have an army of fifteen thousand people and blow up an entire village in one shot, but because what we're trying to do is have an animated rabbit pick up a crumb.' And he was right. A rabbit picking up a crumb is epic in its scope, and that is where the effects guys realized: 'Hey, wait. Anybody can blow up a building. All you need is a lot of power. But how do I do *this*?' That's why everybody was so jazzed by the challenge. It was tough going a lot of the time, but I always











WILLOWS

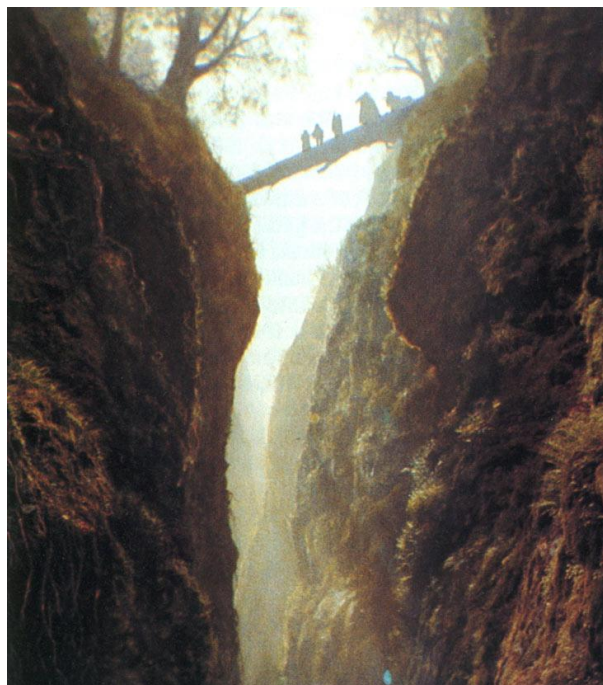
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CINEFEX 3.







called for the Nelwyns to cross a log bridge spanning a great chasm. "We found on location that the little people had difficulty crossing logs and things like that, so for this shot we just photographed them against sky walking on the roof of a rental truck. Then we bipacked them as a silhouette image and dropped that in front of the painting. The only thing live in the whole shot is that silhouette — everything else was created."

In addition to providing spectacular landscapes, the matte department helped to create both the Nockmaar castle of Queen Bavmorda and the castle at Tir Asleen. Early in the film, Bavmorda's castle is introduced in a long establishing shot. Though the surrounding volcanic landscape was shot at Tongariro Volcanic National Park in New Zealand, the castle itself was a painting by Caroleen Green. A closer establishing shot employed a miniature castle in combination with a matte painting. "Mike Pangrazio and Craig Barron discovered a couple of years ago — while working on *Young Sherlock Holmes* and *Starman* — that there are real advantages to using miniatures with matte paintings. Miniatures have incredible perspective, but a matte painting can create a sense of atmosphere and distance better than a model. Combining the two techniques is like making an alloy in metallurgy — the combination of the two ingredients is stronger than either by itself. What we're talking about is not simply having a miniature and then putting a painting behind it. The miniature is shot latent image and then we add the paint to it — so it is actually a blending and intermixing of the two. As far as I can determine it has never really been done before — certainly not to this degree."

Modelmaker Paul Huston — on assignment to the matte department — contributed the miniature castle, extrapolating from a giant partial set constructed at the location site by production designer Allan Cameron. "The miniature castle was about six feet wide by four feet deep," said Huston. "On the full-size set there was a pattern of buttresses with wall sections in between that repeated around the entire castle. So I made two of those sections that were then molded by Wesley Seeds and cast up into about twenty-five pieces that I was able to assemble around the bottom. I also made some towers out of foam core, put styrene stone texture on them and then modified the texture a bit so that it looked more castle-like. The entire scale of the castle was based on finding that particular stone texture in styrene — otherwise most of our labor would have been in just creating that texture." In addition to building the castle — which took only five days to complete — Huston fashioned a forced perspective foreground piece complete with tiny skeletons and other evidence of battles lost and won. "Eric Chris-

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concern over how much freedom he would have with the camera in directing the live-action for the brownie sequences. Would he be able to dolly the camera around or would he have to limit its movement? My first reaction was to advise that he limit his camera movement. By the end of our meeting, however, I had figured out that it could be done with elaborate pin-block rephotography which would allow him to move the camera however he wanted. As long as we made special plates in Vistavision with the right contrast range on them and the right exposure, he could direct the sequences just like normal live-action and the brownies could be plopped down into the backgrounds really well." Pin-blocking — first employed by ILM on the aerial tauntaun shots in *The Empire Strikes Back* — has in recent years become a standard tool at the facility. The technique essentially entails photographing a live-action plate — in the case of *Willow*, one or more brownies full-frame against blue — and then directly rephotographing that footage backlit on a motion control animation stand, thus enabling the subject image to be reduced in size and repositioned anywhere in the frame. By carefully plotting the camera movement in a given background plate, the pin-block operator can correspondingly match-move his bluescreen subject and fit it seamlessly into any part of the frame.

Since perfectly executed background plates were essential to the pin-blocking process, Mike McAlister and a Vistavision camera crew spent five months working side by side with the main unit on locations in England and New Zealand. When principal photography wrapped, McAlister then collaborated with Ron Howard and George Lucas on the selection of plates that would actually be used in the film. Once those were determined, he spent the next hectic month with effects cameraman Kim Marks and stage manager Ed Hirsch preparing for the bluescreen shoot. "At that point there were 172 brownie shots designated to be in the movie," said McAlister. "We located all the backgrounds and studied them and analyzed the lighting and the composition and the angle at which the background had been photographed. Then we made very detailed notes for each shot so that we wouldn't have to figure it out on the set." A prime concern was maintaining the proper scale for the brownies from shot to shot. "A lot of things come into play when determining scale — we couldn't simply rely on a mathematical formula all the time. On most of the shots in England, we photographed a rehearsal or a separate take that had an actual-size brownie doll in the scene to use as a reference for lighting and scale.

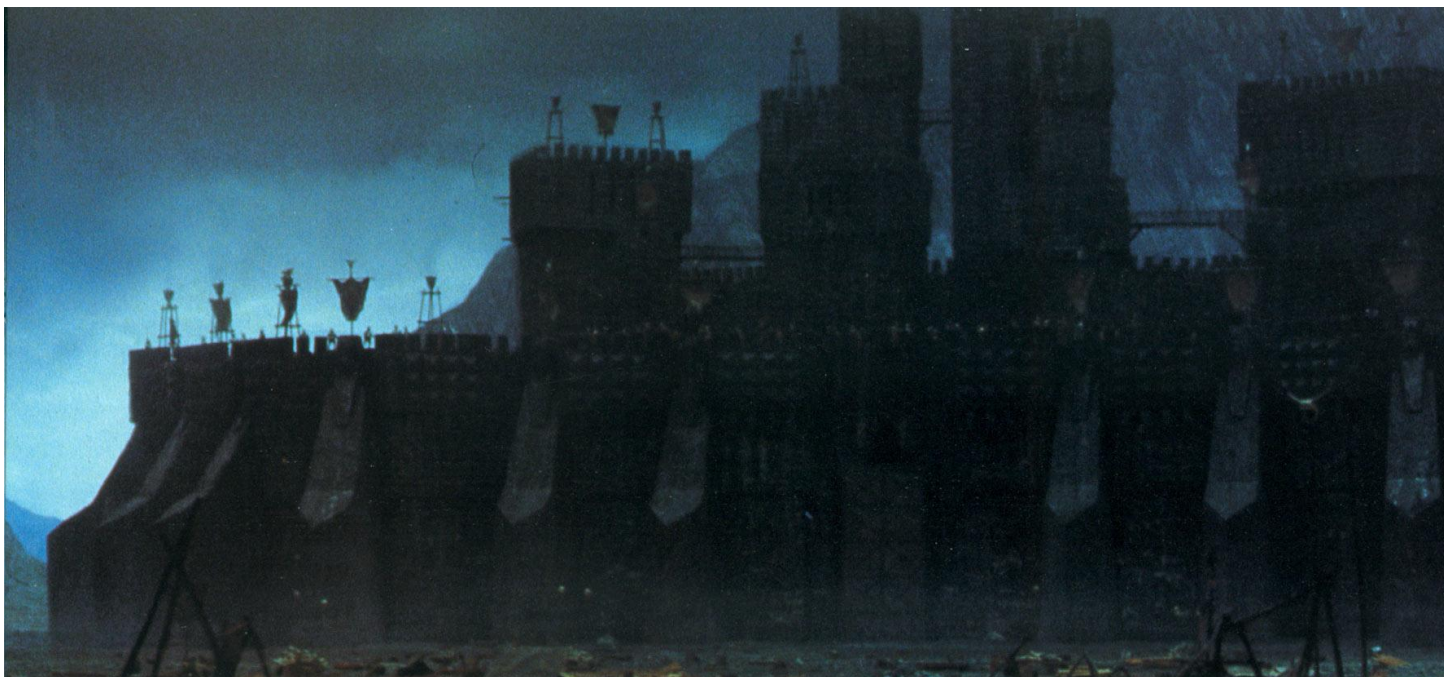
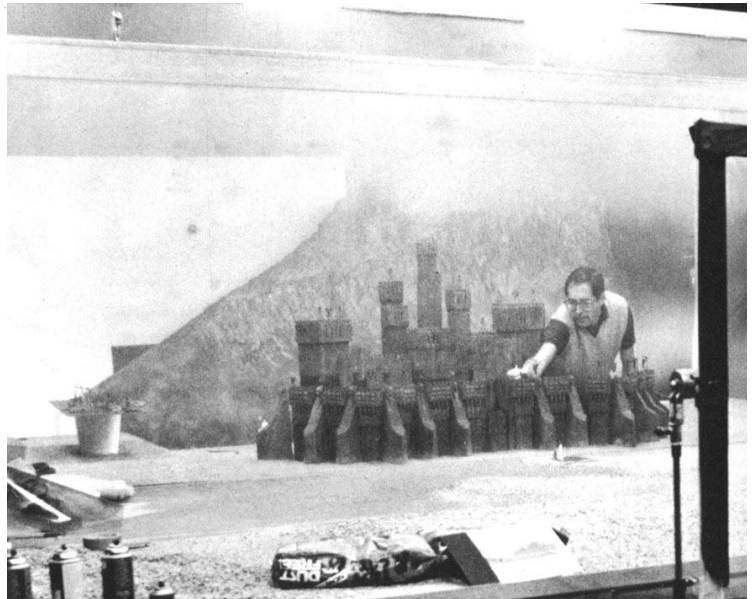
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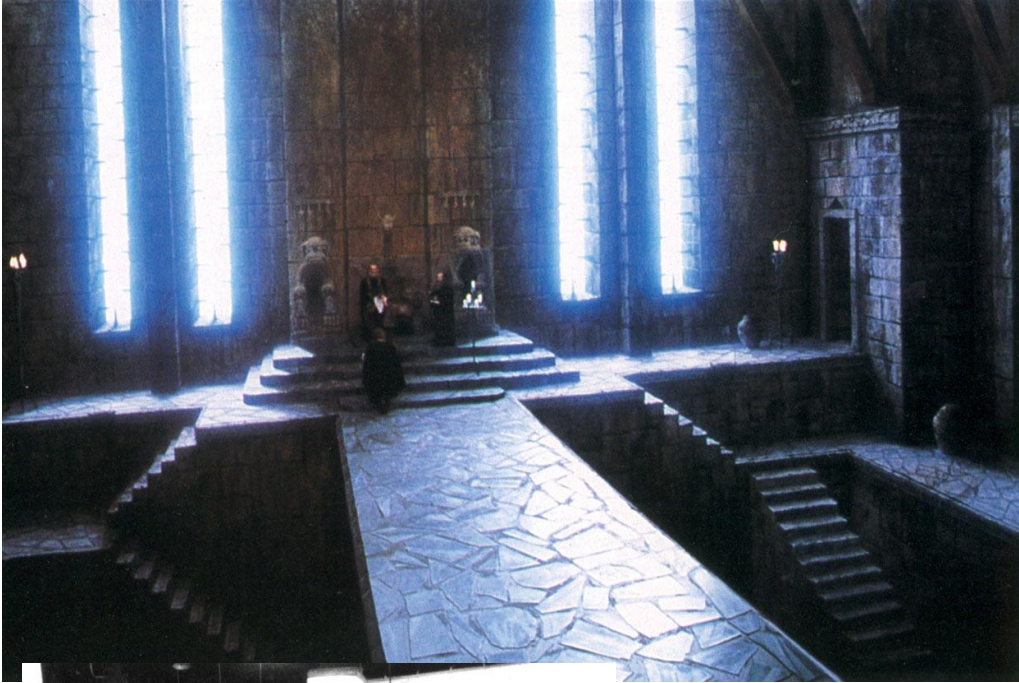
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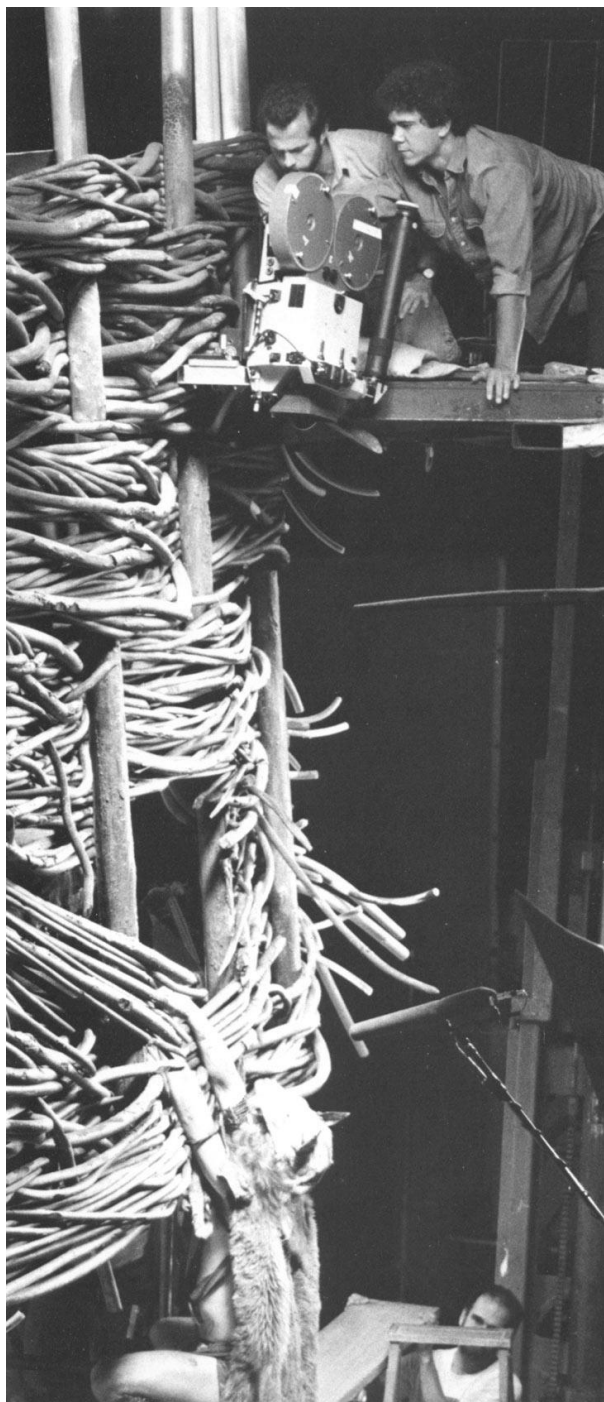
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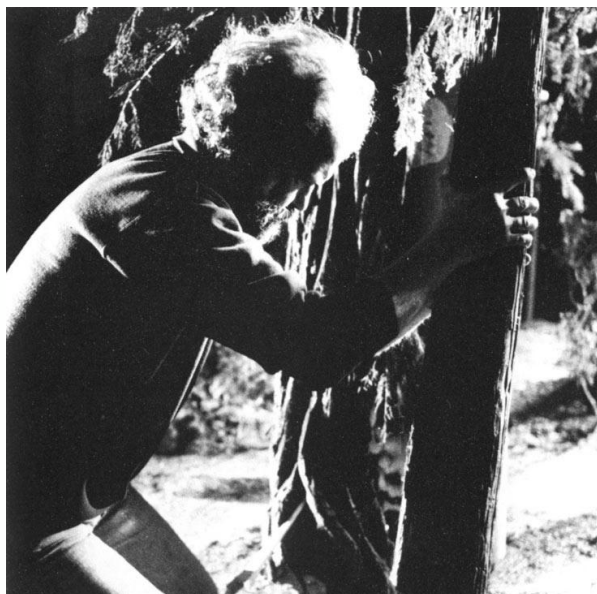


a-half diameter trees from *E.T.* became saplings. Dennis also wanted some big stumps — about two feet in diameter — so Rick Anderson and Chuck Wiley and I each carved one out of green foam. And because there was going to be a lot of back-lighting when Cherlindrea came through the forest, we stripped a lot of bark off real redwood trees and then glued the fibers onto our own trees to create that odd kind of fuzzy look that redwoods have. For branches we used juniper — some of which was still left over from *E.T.* The stuff will last for years. Even if it starts to yellow a bit, all we have to do is touch it up with some spray paint. We also used dead branches and some burnt sections of trunk — anything to give it a little extra character. And, of course, there was a lot of work preparing just the ground cover and little shrubs and all the other things that had to be there besides the actual trees. With all the saplings and everything, the miniature had over one hundred trees in it."

Six people working full-time managed to complete the set in about three-and-a-half weeks. When finished, it covered an area eighteen feet wide by twelve feet deep and had an overall height of approximately ten feet. "Dennis wanted to make sure the tops of the trees were there to eliminate any chance of terminated shadows on the ground. On *Jedi* we used camouflage netting on top of our forest set — and if you look closely, you can see that camouflage pattern in the shadows. To avoid that on this film, we used tree branches in front of the lights to create a natural pattern. Another improvement was putting spikes on the bottoms of all the trees. The whole forest was built on a bed of foam; so anytime we wanted to move a tree, all we had to do was just pull it out and stick it somewhere else. In forest shots in the past, Dennis would have to pick and choose his camera angles very carefully; but in this case he was able to do anything he wanted, because any tree at all could be moved about and repositioned or totally eliminated in favor of another." Shooting the miniature forest took about a month. To create the interactive illumination emanating from Cherlindrea, a stage light was attached to a twenty-foot boom arm mounted on a motion control track for maximum steadiness. Since the camera was shooting at one frame per second, the boom had to move very slowly and smoothly. Smoke was pumped into the set to add a sense of eeriness.

Cherlindrea's materialization — and later dematerialization — was an effect worked out by John Knoll. "I rear-projected a moving plate of Cherlindrea," Knoll explained, "and took two pieces of ripple glass that were on motorized movers. Starting with the ripple glass down in contact with the screen, the image

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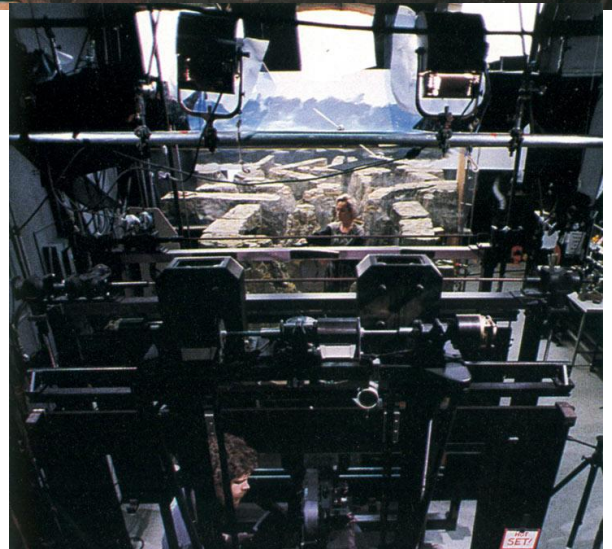


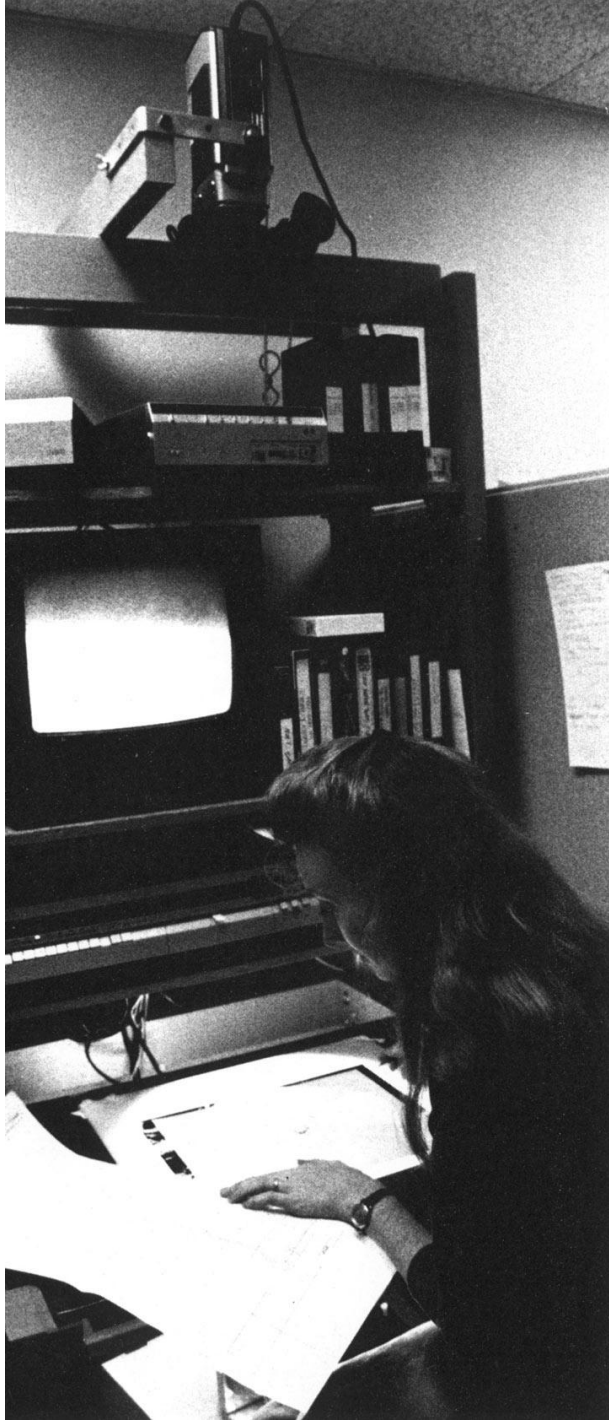
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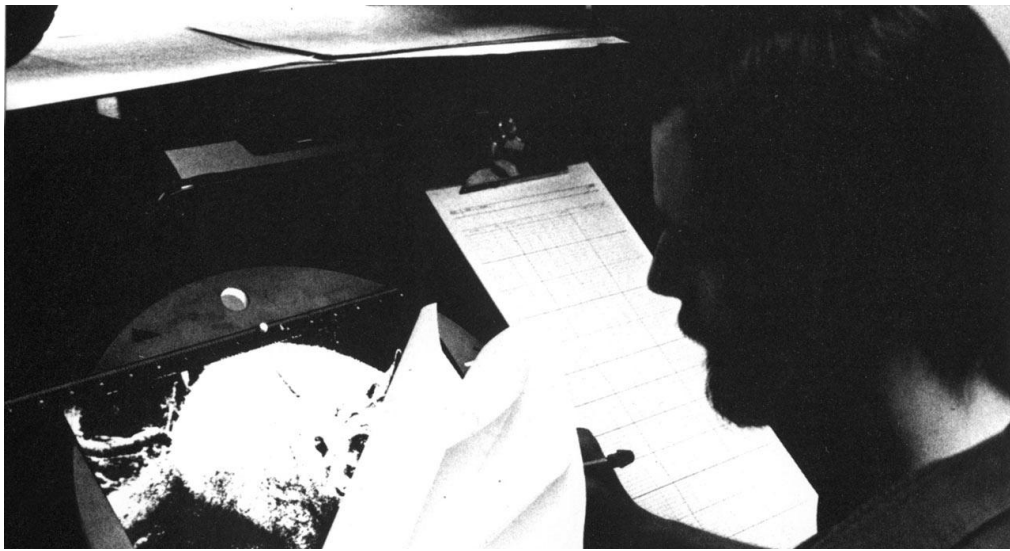
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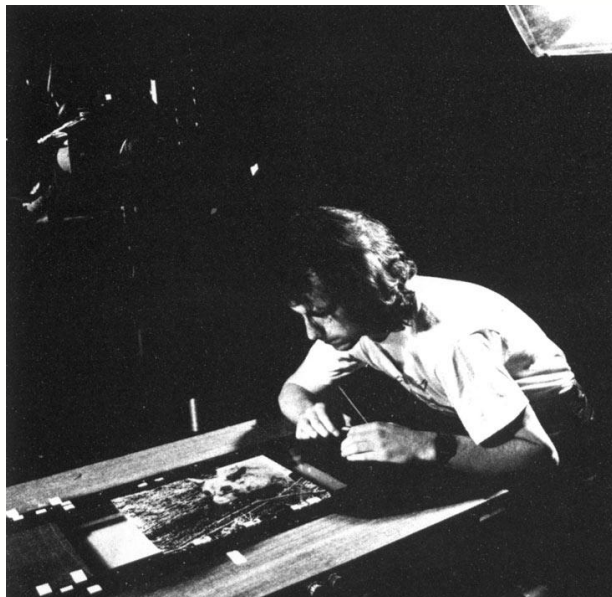
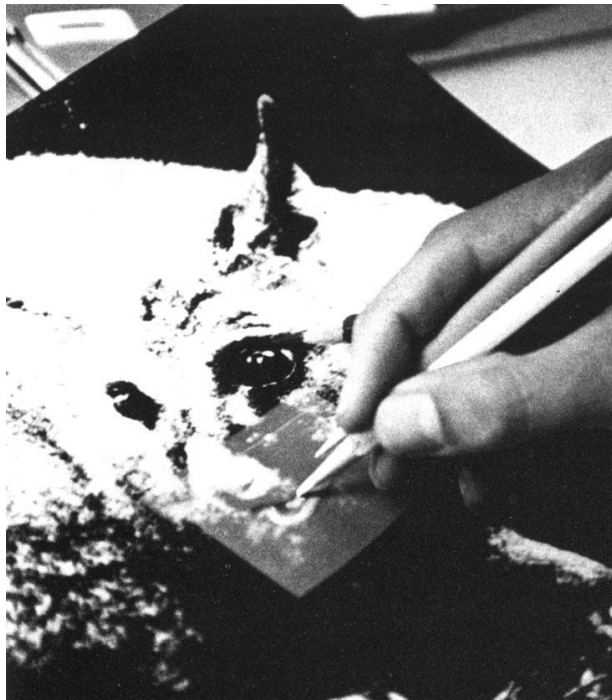
The predicament of the forest brownies — a technical challenge that entailed the actors fulfilling a bluescreen rephotography of the stand in position and appropriate lighting plotted for the scene.









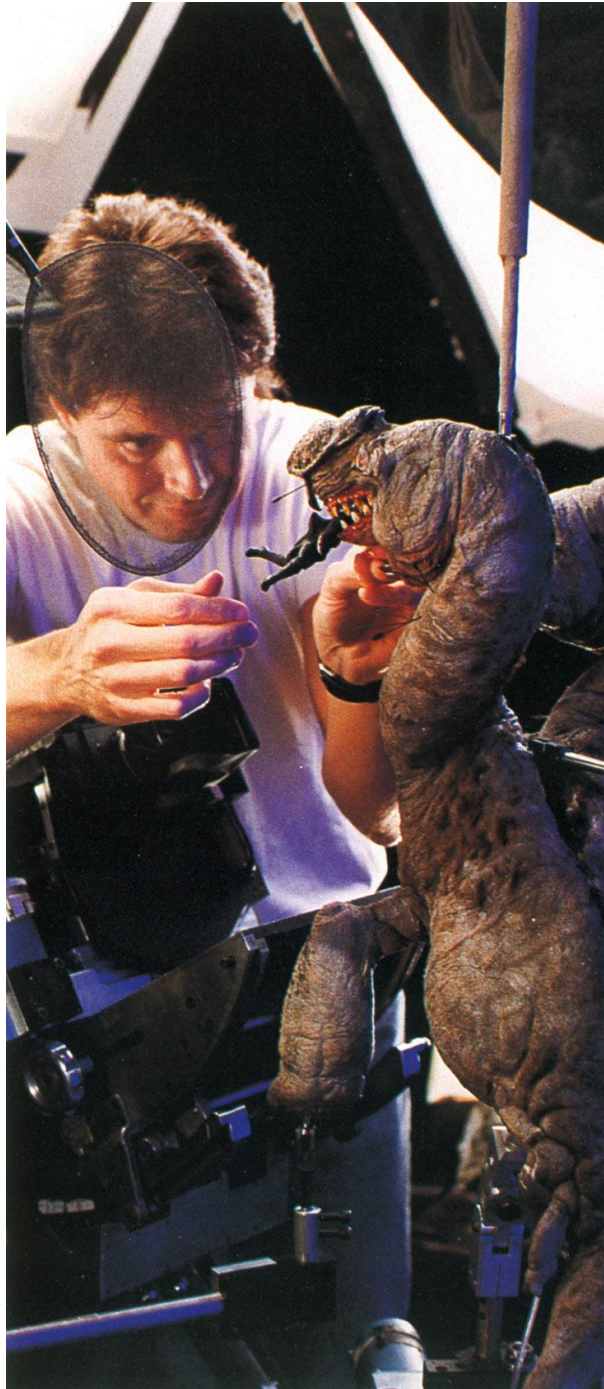


saw a test showing what we could do with animation that they'd fall all over themselves rushing to the mind-melding idea or to guys with their hands stuck inside animal puppets. But we agreed to take it on — and as it turned out, no puppets were used at all."

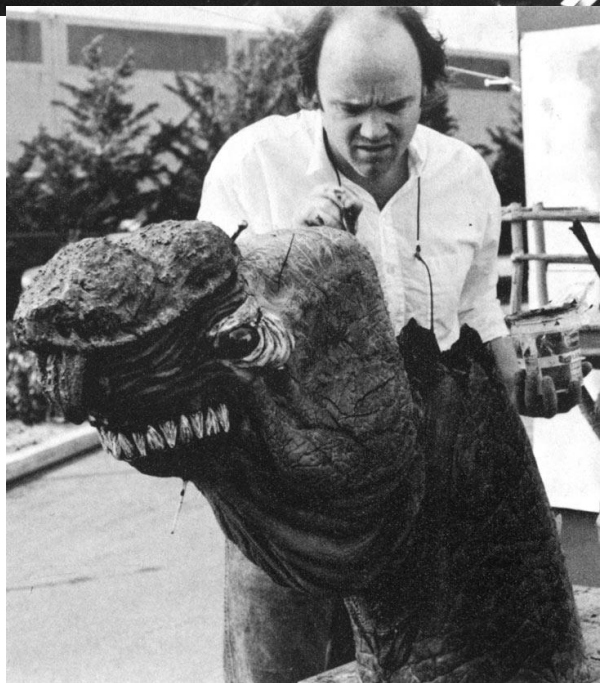
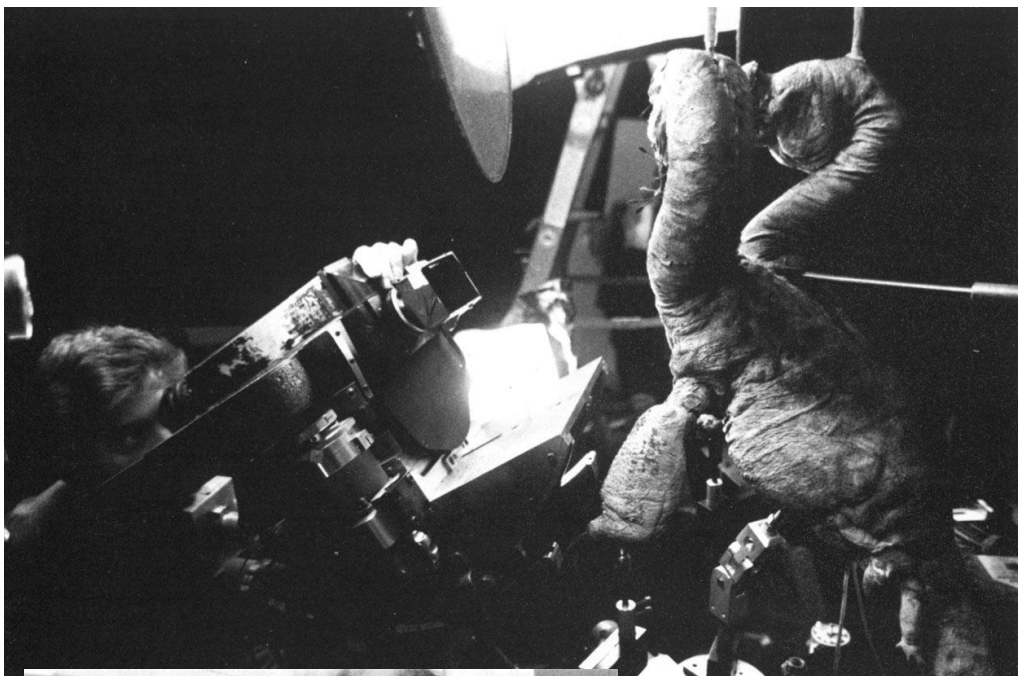
Basically, Available Light used a modified animation technique to create a semblance of speech in the live-action animals. "We elected to go with a photo-rotoscope approach rather than standard rotoscoping because we needed every nuance of angle we could get and to draw that kind of detail would have taken forever. We have a little mini-processing machine, so all we did to produce the photo-rotos was just take the workprint and project it down onto positive print paper. As far as the animation was concerned, we were only working within a small area of the frame — maybe one percent — so the bigger we could go, the better the detail was going to be when it was shrunk down. Consequently, we enlarged each frame to cover the entire top of the Oxberry bed — about forty inches across — but because the only thing we were actually concerned with was the mouth, we would then just go in and photo-rotate a twelve-inch-wide area." While the photo-rotos were being made — some two thousand of them — Bill Arance produced a standard cartoon-style sound reading. Working with a magnetic sound track provided for the shots they would be animating, he employed a squawk box and a synchronizer to transfer the animal dialogue first onto 35mm paper tape and then to count sheets the animators could use to cue their vocalizations.

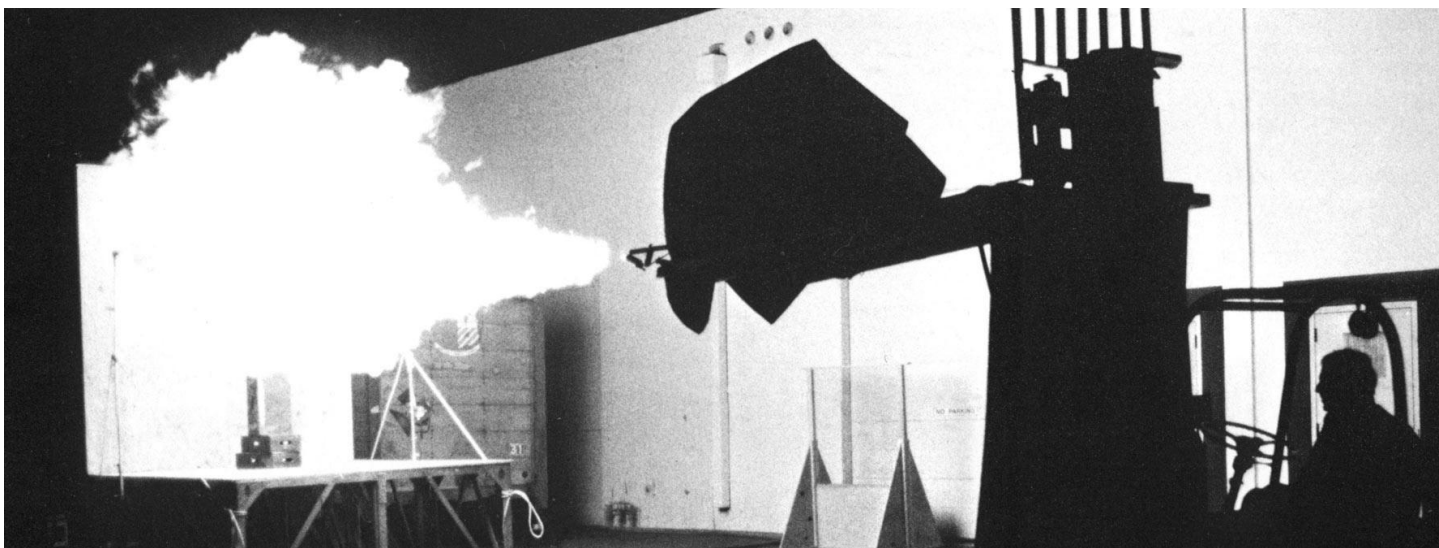
Once the photo-rotos and the sound readings were completed, the next step was the actual animation — done by John Van Vliet, Mike Lessa, Kathleen Quaife-Hodge and Daryl Rooney. Before the animation could begin, however, Van Vliet and his crew had some research to do. "It was like taking a crash course in animal dentistry. We went to the library and tried to find pictures of possums, for instance, with their mouths open. We never did find the exact kind of possum that was in the film, but we got close enough. Then we came up with a model sheet for the mouth and we put a lot of detail into it. Next we took the workprint and studied it to decide what we wanted to do and where we wanted the nuances. Then we went in and did our breakdown. We did it on eights first — just going in and blocking it out real fast. If that seemed to be working and flowing well, we went back and did it on fours, cleaning it up a little bit as we went. Once we got on fours we started doing video tests and running the soundtrack with it. From there we just kept refining it until it worked perfectly — kind of like sculpting. One of the differences between doing this and standard cartoon animation was that there had to be a blur. In cartoon animation there is no blur factor between frames — but because it is a cartoon world, it reads fine and everybody buys it. We also found that we had to 'deanimate' stuff and take out a lot

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With a magic wand given to him by Cherlindrea, Willow at last manages to restore Raziel to her human form — but only after propelling her through a quick succession of other creatures en route.

To accomplish the transformation — from goat to ostrich to turtle to tiger to woman — in an uninterrupted flow, Dennis Muren enlisted the full resources of the creature shop and the computer graphics department. A series of animatronic puppets was used — with the transitions between them achieved via computer animation. The first puppet was a third-scale goat created by mechanics designer Tad Krzanowski. /

As the transformation to ostrich commences, horns and ears are withdrawn and the puppet begins to stretch. / Fully extended, the air-filled goat head is subjected to vacuum pressure which draws the outer features down onto an inner ostrich skull. / Puppeteering coordinator

all of the flame elements — and it was really terrifying because in some instances these twenty-foot flames were shooting straight towards the camera. Pat was behind a glass enclosure for protection, but the first time they tested the flame he let out a bloodcurdling scream — which fortunately turned out to be a scream of terror rather than a scream of pain."

In the end, the Eborsisk self-destructs when Madmartigan — astride one of the heads — drives his sword through the monster's muzzle, pinning its mouth shut. Unable to vent its fiery venom, the methane sack expands with internal pressure and finally explodes. "We built a large Eborsisk head — about two-and-a-half feet long — and loaded it full of pyro material. Then we blew it up and shot it high-speed. The exploding head was carefully matched to a stop-motion shot that Harry Walton did of the monster rearing back, inflating its sack and starting to sneeze. We cut directly from the stop-motion head to the high-speed head when the explosion starts — and everything happens so quickly, it looks like it's part of the same cut."

Optical compositing for the sequence was supervised by Bruce Nicholson. "The main problem we had to deal with was the fact that the live-action material was shot with smoke. The Vistavision plates and the Eborsisk were shot without smoke because we were dealing with matted elements. As a result, we had to simulate in optical what was happening with smoke in the live-action. It became fairly complicated because the smoke kept changing from shot to shot in the live-action depending on wind conditions or how much smoke they had used. Finally we worked out an approach that involved flashing the scenes and/or using smoke elements that were shot at ILM against black. We put layers of flash into the scenes — foreground, midground and background — varying the levels depending on the cut. Normally, the monster would be in the foreground and we would have a certain percentage of flash over him and then a certain percentage behind. There were some shots where matte paintings were used to fill in the background and we would have to flash those areas as well. Then a smoke element might be put in, which would also be layered. But it was always determined cut by cut." Flashing also helped to blend the mismatched rear-projection and bluescreen shots by desaturating everything in the frame.

Despite the rebel victory over the two-headed dragon, trolls and even General Kael's army, little Elora Danan is captured and taken to Nockmaar where Bavmorda waits to perform her ritualistic killing. Intent on rescuing the child, Willow and Madmartigan lead their small band to the dark castle where Willow at last manages to restore Fin Raziel to her human form — but

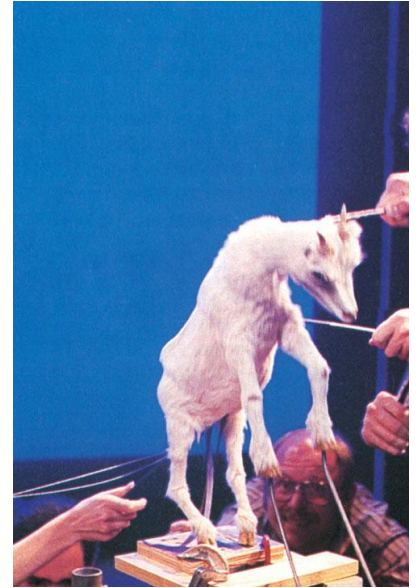


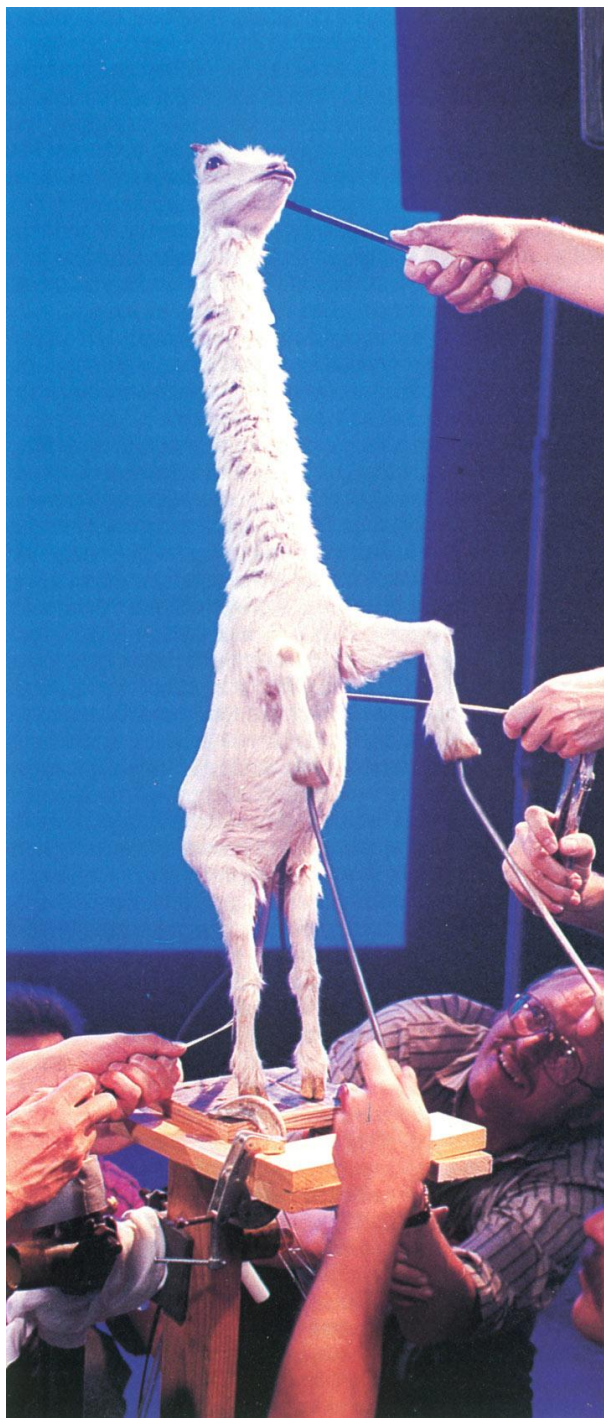
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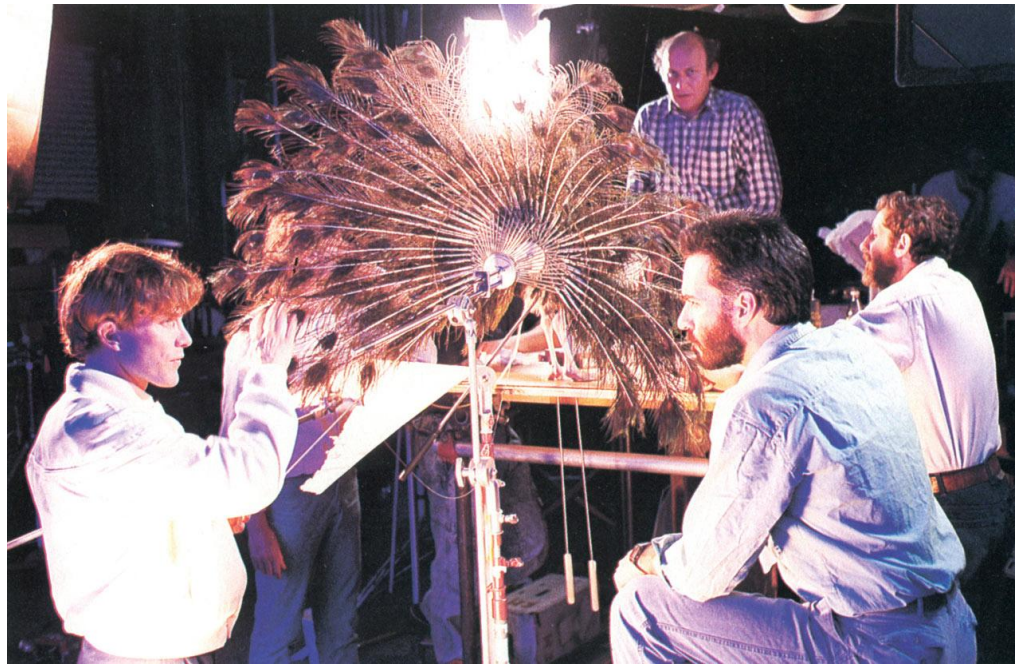
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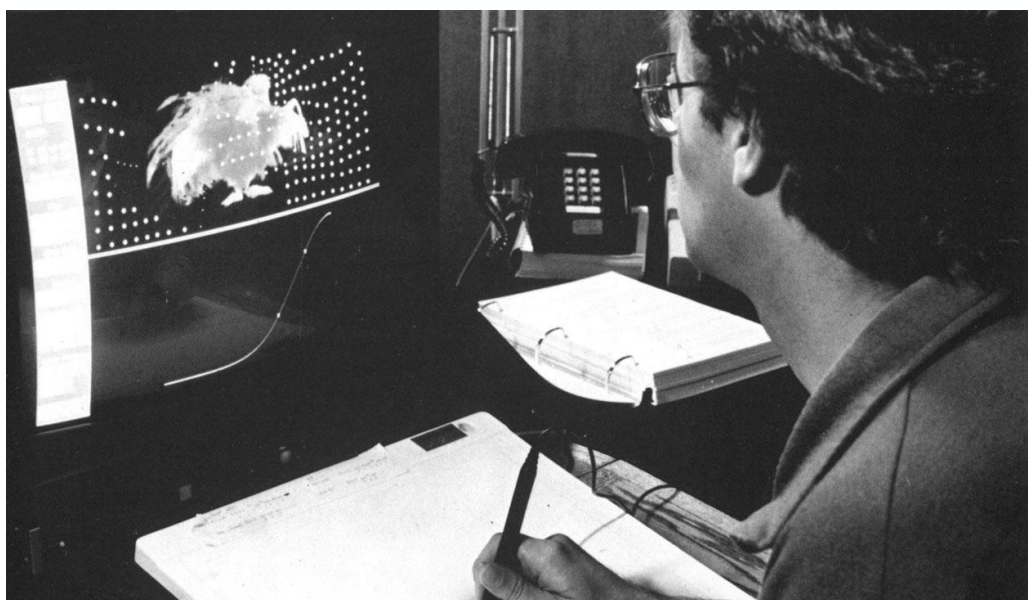
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actually become as long as she started with a woman. We were determined to do it right — we wanted them to see the difference which meant lingering on it and not cutting it. Given these requirements, Muren considered which technique would best serve the sequence. "Really debating whether to go with traditional animation and things like that or try to do something computer-generated. The second option was really beyond us, because so far there weren't any programs that are time-efficient. It would have just been to get up to speed and then several months of animation. So we came up with a hybrid combination of models and the digital. If we designed it right, we would get something nobody had seen before using something being practical than a fully computer-generated would be. Our first idea was to go from a goat to a woman because the faces are similar, but George Lucas was different enough. So I got to thinking that maybe this work would be to take advantage of the ability to do things that cannot be done with a big scale change, for instance, going from small to something really big. So at that point for opposites — from a goat to an ostrich to a woman. We played up the difference going from one thing to something else that was completely different."

Muren's hybrid approach called for the creation of a series of puppets capable of providing the transition to which the computer graphics could be added. In the final part of the transformation into the ostrich, the final stage of one puppet and the beginning of the next, following it, the computer graphics department was able to digitally blend the transition between the two — from goat into ostrich — was an ingenious half-scale rod puppet realized. "The goat puppet was cast in foam and had a fiberglass core. The whole front third of the body — from the head to a point behind the front legs — was designed so that the armatured legs were moved in the proper way into something resembling a wing shape. It was an excellent job of sculpting it so that when it was in the goat position it looked like a goat, but when it was in the ostrich position it looked like an ostrich. The neck was the puppet because it had to expand to become the ostrich neck. We used a special mechanism that had a telescopic action — an eye that could be compressed to an inch and expanded to a foot."



CINEFEX 35



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 eral hours to a day to see it on film." In
 the digital matting process actually pro
 traditional optical procedures. "To do a
 didn't need both a clear-core matte an
 Luskien revealed. "We managed to get av
 started out with a very straight color-d
 similar to what the video Ultimatte sys
 into the same kinds of fringing problem
 happen when they try to do that optic
 some of the more advanced methods ei
 department to create our mattes in othe
 ing a synthetic blue record which we
 difference technique. We did it different
 look at the ones we did in the beginni
 with the ones we did in the end, you w
 much better because we learned as we
 some of the tools for manipulating m
 people have, but the biggest area we are l
 The optical department has so much e
 haven't been at it that long."

After the bluescreen extraction, the
 Smythe for the actual transformation p
 to take each of two successive puppet
 them into a single flowing image that
 resented a digital average of the two. "I
 tion process," said Smythe, "I worked wi
 images that allowed me to fit one fra
 sequence on the screen at the same tim
 of tools that I have to work with. Ther
 basis, I would pick corresponding points
 the computer program would calculate
 to move to get from one to the other. Fo
 dots around the eyes or along stripes c
 the program would calculate how they m
 each other to merge at the end. It was as
 frame of film on a rubber sheet and the
 that could be stuck into the rubber at var
 around — left and right or up and down

"For each creature at the beginning c
 have a strip of film that ends on a ce



the ability to process small sections of ti
 "We could tweak a parameter and then
 utes later we would see the result. S
 iteration time. It wasn't like tweaking a
 and seeing a real-time response, but it w
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